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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/612,925 | 07/07/2003 | Takahiro Kawano | 239801US2 | 6929 |
| 22850 | 7590 | 07/11/2006 | EXAMINER | |
| OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314 | | | NADAV, ORI | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2811 | |

DATE MAILED: 07/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/612,925

Applicant(s)

KAWANO ET AL.

Examiner

Ori Nadav

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 May 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-7,9,17,19-21,23-25,27,35,37-39,41 and 43-51 is/are pending in the application.
- 4a) Of the above claim(s) 2,7,9,17,19,20,25,27,35,37,38 and 48-51 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4-6,21,23,24,39,41 and 43-47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 4-6, 21, 23-24, 39, 41 and 43-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagata et al. (6,316,814) in view of Applicant Admitted Prior Art (AAPA).

Nagata et al. teach in figure 1A and related text a semiconductor device comprising:

a semiconductor layer which includes a first semiconductor region 14 of a first conductivity type, a base region 12 of a second conductivity type, and a plurality of second semiconductor regions 20 of the first conductivity type;

a gate wiring 13 which is formed on the semiconductor layer via a first insulating film 16;

a plurality of main electrodes 15A (or the electrode located just below line 15A, see also figure 1B) which are electrically connected to the plurality of second semiconductor regions and which are insulated from the gate wiring, wherein the gate wiring is arranged between the main electrodes;

a second insulating film 24 which is formed on the surface of the uppermost layer of the gate wiring; and

upper surfaces of the main electrodes are higher than the highest portion of an upper surface of the gate wiring.

Nagata et al. do not teach a connecting plate which is connected to a lead frame and is directly connected onto the upper surfaces of the main electrodes.

AAPA teaches in figure 21 and related text (page 3, lines 9-10) a connecting plate 2109 is directly connected onto the upper surfaces of the main electrodes of the device 2105.

AAPA further teaches in figure 20 and related text a wiring 2004 is directly connected between the main electrodes of the device 2002 and the lead frame 2003. AAPA also teaches that the connecting plate replaces the wiring connecting the main electrodes of the device and the lead frame.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a lead frame in Nagata et al.'s device and to connect a connecting plate directly between the upper surfaces of the electrodes and the lead frame in Nagata et al.'s device in order to operate the device in its intended use (by providing lead frame and external connections), and in order to reduce the contact resistance of the device by using a connecting plate between the electrodes and the lead frame. The combination is motivated by the teachings of AAPA which points out the advantages of using a connecting plate instead of external wiring.

Regarding the claimed limitations of main electrodes being in contact with a contact region of the connecting plates and in an area under the contact region of the connecting plates the upper surfaces of the main electrodes are higher than the highest portion of an upper surface of the gate wiring, these features are inherent in prior art's

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device because the main electrodes are connected to the connecting plates and they thus must be in contact with a contact region of the connecting plates. The area under the contact region of the connecting plates must be where the upper surfaces of the main electrodes are higher than the highest portion of an upper surface of the gate wiring, because the contact region must be located above the upper surfaces of the main electrodes.

Regarding claims 4, 21, 23, 39, 41 and 44, AAPA teaches gate wiring 2107 comprising aluminum. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to form the main electrodes and the connecting plate of a plurality of metal layers comprising aluminum in Nagata et al.'s device in order to reduce the contact resistance between the main electrodes and the lead frame.

Regarding claims 4 and 46, Nagata et al. teach a second insulating film 24 extends between plurality of metal layers, and under the main electrode.

Regarding claim 5, Nagata et al. teach in figure 1 plurality of main electrodes are formed apart from the gate wiring with a gap there between.

Regarding the process limitations recited in claims 23 and 41 ("the first connecting plate is connected to the first main electrode and the second main electrode by ultrasonic

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bonding”) these would not carry patentable weight in this claim drawn to a structure, because distinct structure is not necessarily produced.

Note that a “product by process” claim is directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also *In re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and *In re Marosi et al.*, 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a “product by process” claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in “product by process” claims or not. Note that the applicant has the burden of proof in such cases, as the above case law makes clear.

Regarding claims 6, 24 and 43, Nagata et al. teach a first gate electrode which is formed in the cell forming region and controls continuity between the first semiconductor region and the second semiconductor region; and first and second main electrodes (see the array in figure 1B) which are electrically connected to the plurality of second semiconductor regions respectively and which are formed at predetermined intervals in the cell forming region on the semiconductor layer.

Regarding claim 24, Nagata et al. do not teach a first semiconductor layer of a first conductivity type. It would have been obvious to a person of ordinary skill in the art at

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the time the invention was made to form a first semiconductor layer of a first conductivity type in Nagata et al.'s device in order to improve the electrical isolation of the device.

Regarding claims 43, 45 and 47, the claimed limitations of main electrodes comprise a first main electrode layer and a second main electrode layer which is formed on the first main electrode layer, wherein the second main electrode is thicker than the first main electrode layer, these features are inherent in prior art's device, because the first main electrode layer is not necessarily distinguishable from the second main electrode layer. Thus, the main electrodes of prior art's device can be arbitrarily divided into a first main electrode layer and a second main electrode layer which is formed on the first main electrode layer, wherein the second main electrode is thicker than the first main electrode layer, as claimed.

Response to Arguments

Applicant argues that it is not possible to add a connecting plate to Nagata et al.'s device, because the photoelectric conversion structure of said device.

The connecting plate does not need to obstruct the operation of Nagata et al.'s device. The connecting plate is used instead of the external wiring which connect the main electrode Vdd to the lead frame. Clearly, Nagata et al.'s device cannot operate without external connections to the main electrode Vdd.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ori Nadav whose telephone number is 571-272-1660. The examiner can normally be reached between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



O.N.
7/6/06

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